Application of pre-programmed PDA devices equipped with GPS to conduct paperless household surveys in rural Mozambique

Ramesh Krishnamurthy, PhD, MPH [1], Anatoly Frolov, PhD [2], Adam Wolkon, MPH [2], Jodi Vanden Eng, MS, MPH [2], and Allen Hightower, MS [2]

[1] Public Health Informatics Fellowship Program, Career Development Division, Office of Workforce and Career Development, Centers for Disease Control and Prevention Atlanta GA 30333;

[2] Division of Parasitic Diseases, National Center for Infectious Diseases, Centers for Disease Control and Prevention, Atlanta GA 30333

Abstract: Personal digital assistants (PDAs) are extending how we use software normally associated with desktop and laptop computers. As interface design improves and specialized software becomes available, health professionals are choosing to use PDAs. A logical next step to use PDAs is in remote areas where electronic data collection is needed and electricity is limited. A test of PDAs', equipped with global positioning system, ability to improve household surveys in rural Mozambique was completed in February 2006.

Introduction: Researchers face substantial challenges when conducting household surveys in technologically less developed regions, such as parts of Africa , or in disaster affected areas. Lack of detailed maps, location of houses, and valid addresses are impediments to conducting surveys in the region. Using paper surveys, training interviewers to follow elaborate skip patterns and perform in-the-field data accuracy checks can be difficult. Furthermore, computerizing data in the region is often fraught with problems due to lack of technical infrastructure. This study presents an alternative through the use of a novel approach that allows a interview teams to overcome the aforementioned problems.

While the technology is not hardware intensive, an interview team, each equipped with a personal digital assistant (PDA) with global positioning system (GPS) unit, can accomplish all tasks needed to collect statistically valid survey data with high performance metrics. This technology has been used to conduct surveys to assess the increase in insecticide-treated bednet (ITN) coverage resulting from the integrated intervention campaigns in regions affected by malaria in Togo, Niger, and Mozambique.

System Overview: This poster demonstrates the use of pre-programmed PDAs with geopositioning capacity using GPS survey selection software, developed by the Centers for Disease Control and Prevention (CDC), to conduct a statistically valid assessment and present preliminary analyses within 24 hours of the last completed survey. The software application (GPS Survey, version 2.0) allows rapid mapping of all households in the survey area, as well as landmarks, for spatial analysis in regions of the world where access to detailed topographical maps is limited or absent. It allows the researcher to choose a statistically valid sample of households and navigate back to them to conduct interviews. During the interview, the program leads the interviewer with preprogrammed skip patterns, checks and safely stores data upon entry, and downloads data to a laptop computer for rapid analysis.

Initial analysis of Mozambique household mapping data revealed that using the aforementioned technology, location of 4855 houses dispersed in 32 villages or neighborhoods in 8 districts of Manica and Sofala provinces of Mozambique were mapped in 10 days using 18 field interviewers. Data were aggregated, analyzed, and presented in less than a day. Using GPS 2.0 software application, mapping of individual houses within each enumeration area, spanning several square kilometers, was completed in between 3.5 and 4.5 hours.

Summary: The application of PDA and GPS based technology to conduct surveys in remote regions of Mozambique was important in assuring data quality, obtaining a statistically accurate random sample with geospatial data, substantially reducing the data entry time, and rapidly making data available for analysis.

Acknowledgements: The authors acknowledge the support of Marcy Erskine (Canadian Red Cross), Dana Crenshaw, William Hawley, and Joni Young of Division of Parasitic Diseases, Robert Pinner of Office of Surveillance, Dale Nordenberg, Office of Informatics, Bobbie Person, Office of Director, National Center for Infectious Diseases, CDC and Janise Richards of the Public Health Informatics Fellowship Program, sponsored by the Office of Workforce and Career Development at CDC administered by the Oak Ridge Institute for Science and Education through an interagency agreement between the U.S. Department of Energy and CDC.